genius loci chapterone 2013
The International Conference on
Climate Change and Local Wisdom:
Living in Harmony within Our Built Environment

Minimizing Climate Change Impacts through the Application of Green Building Principles

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Outline

- Emerging Issues
- Sustainable Building
- Green Building Certification
- LEED New Construction & Major Renovation
- Conclusion

Message 1 - the depletion of energy and fuels

- It is probably safe to say that any building built today that uses fossil fuels will outlive the availability of its fuel sources
- Economic renewables and safe nuclear power may emerge in time
- In any case we must ensure that buildings will be able to adapt to a variety of future energy scenarios, just like the Hybrid car.
- In all cases, a high degree of energy efficiency will be essential.

Message 2- Material Shortage

- The immediate issue is shortages and high cost of some materials, due to rapidly increasing demand from China and India;
- Even materials such as steel and cement are part of a global market, so no region is immune;
- Some European suppliers had shortages of cement;
- Petroleum product prices are escalating, and a residual amount will be needed for plastics;
- The level of global demand is likely to keep on rising, so some raw material prices may escalate further, making lean design more important.

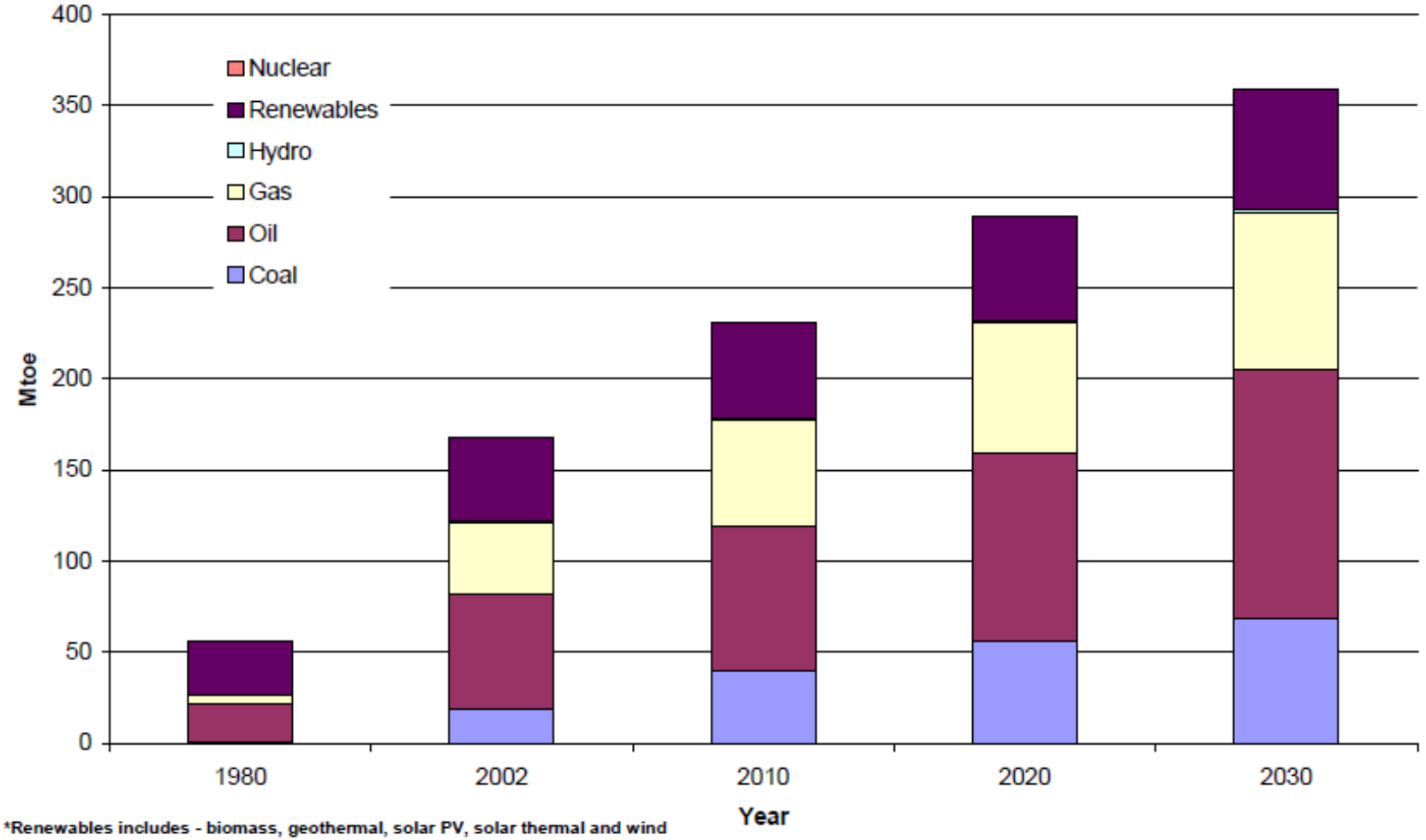
Climate Change Links with the Building Sector

Cause	Intermediate	End Results
Higher temperatures	Need more AC Insect population	Operating cost More energy & GHG Repair / control
High winds	Wind damage	Repair / rebuild
Rain & Flood	Flood damage	Repair / relocate
Drought	Water supply Soil instability Forest fires	Import Repair / relocate Rebuild / relocate
Sea level rise	Vilnerable areas	Relocate

What role does the building sector play ?

- Statistics from the World, USA, Canada and Hong Kong shows that the building sector accounted for 28.7% of total GHG emissions;
- The building sector share is therefore significant, but it should be recognized that the location and design of buildings has secondary impacts on both Industry (materials) and on transportation (commuting transport);
- Thus, the building sector is probably the most significant of all sectors, at perhaps 35%+.
- What about Indonesia?

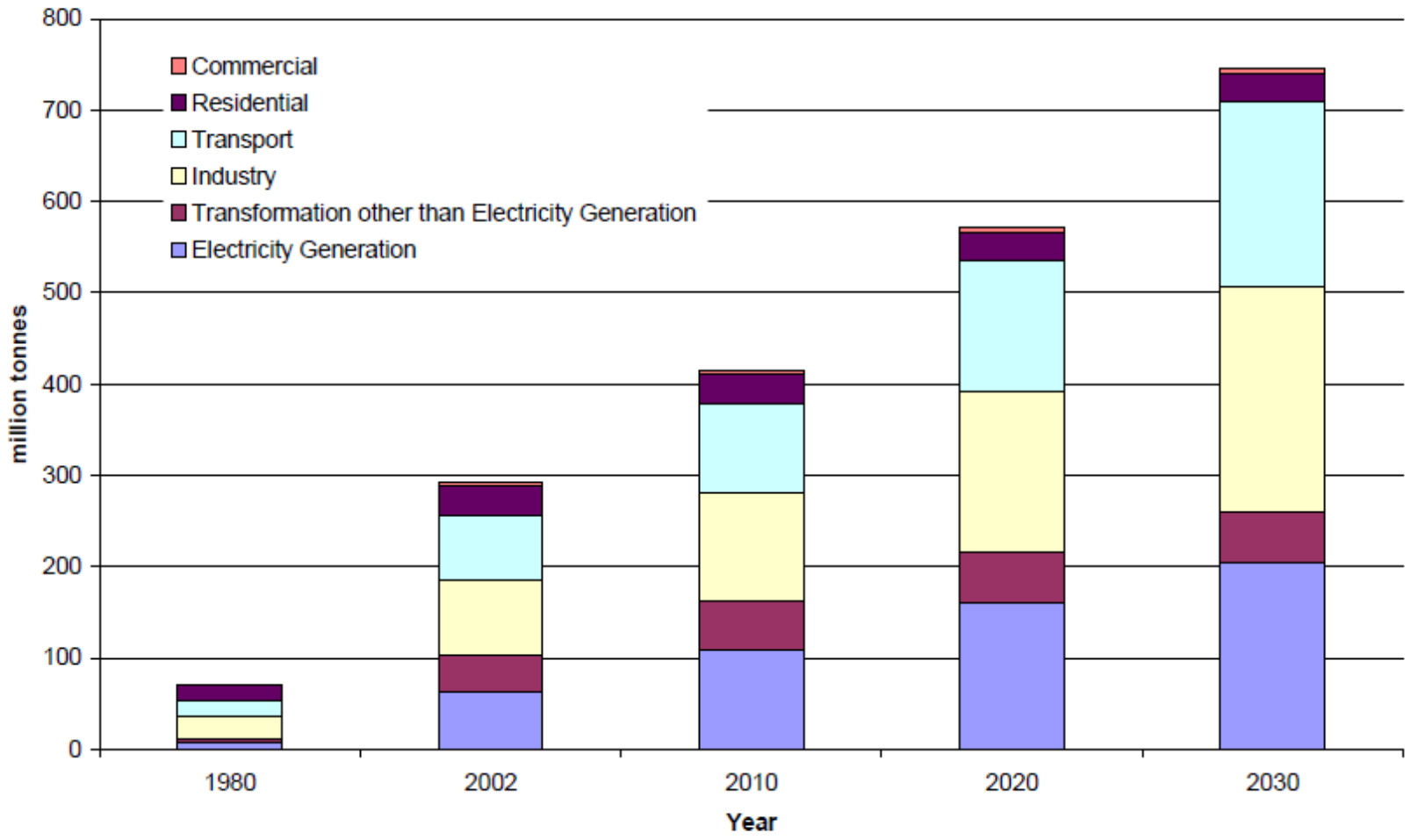
FIGURE 1: PRIMARY ENERGY SUPPLY BY SOURCE



*Renewables includes - biomass, geothermal, solar PV, solar thermal and wind

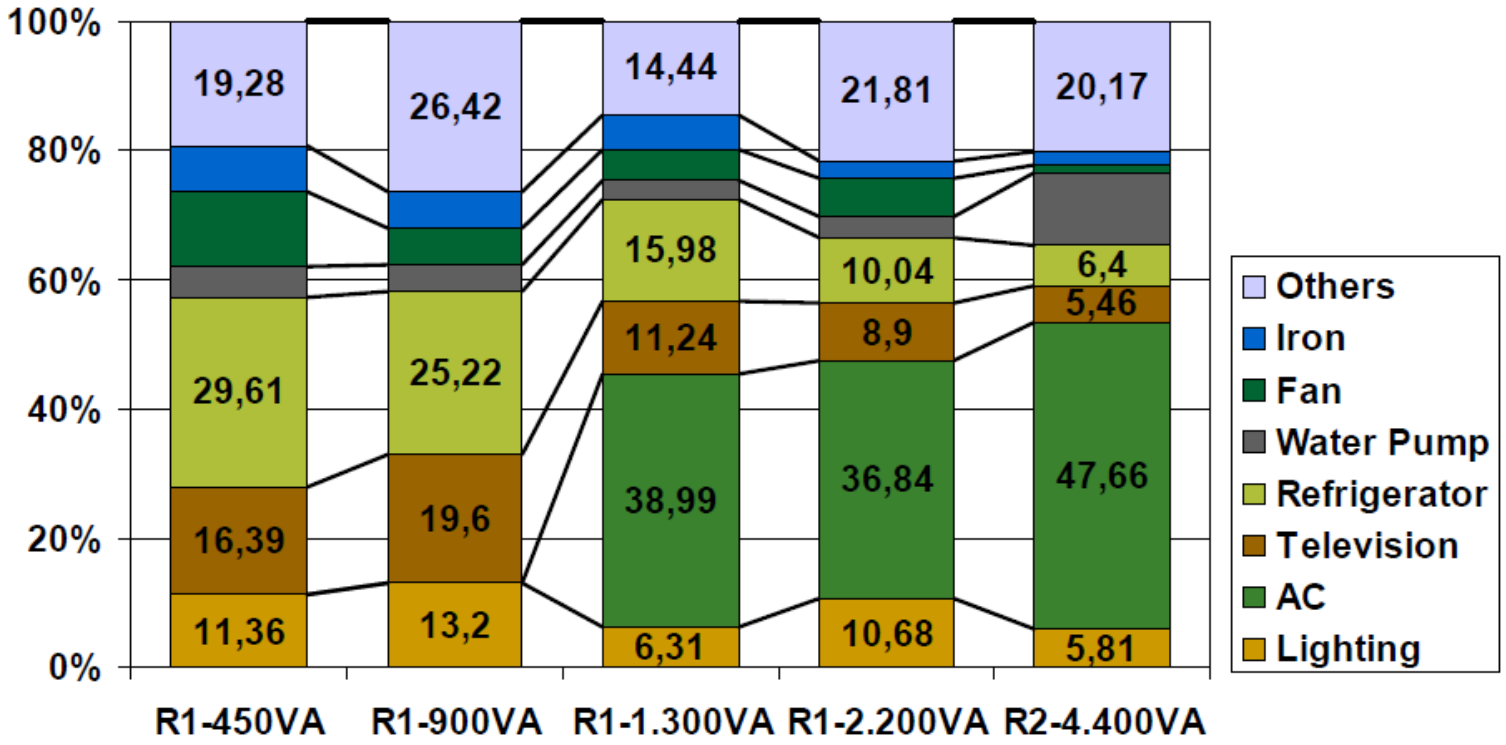
Source: APERC (2006).

FIGURE 2: CO_2 EMISSIONS BY SECTOR



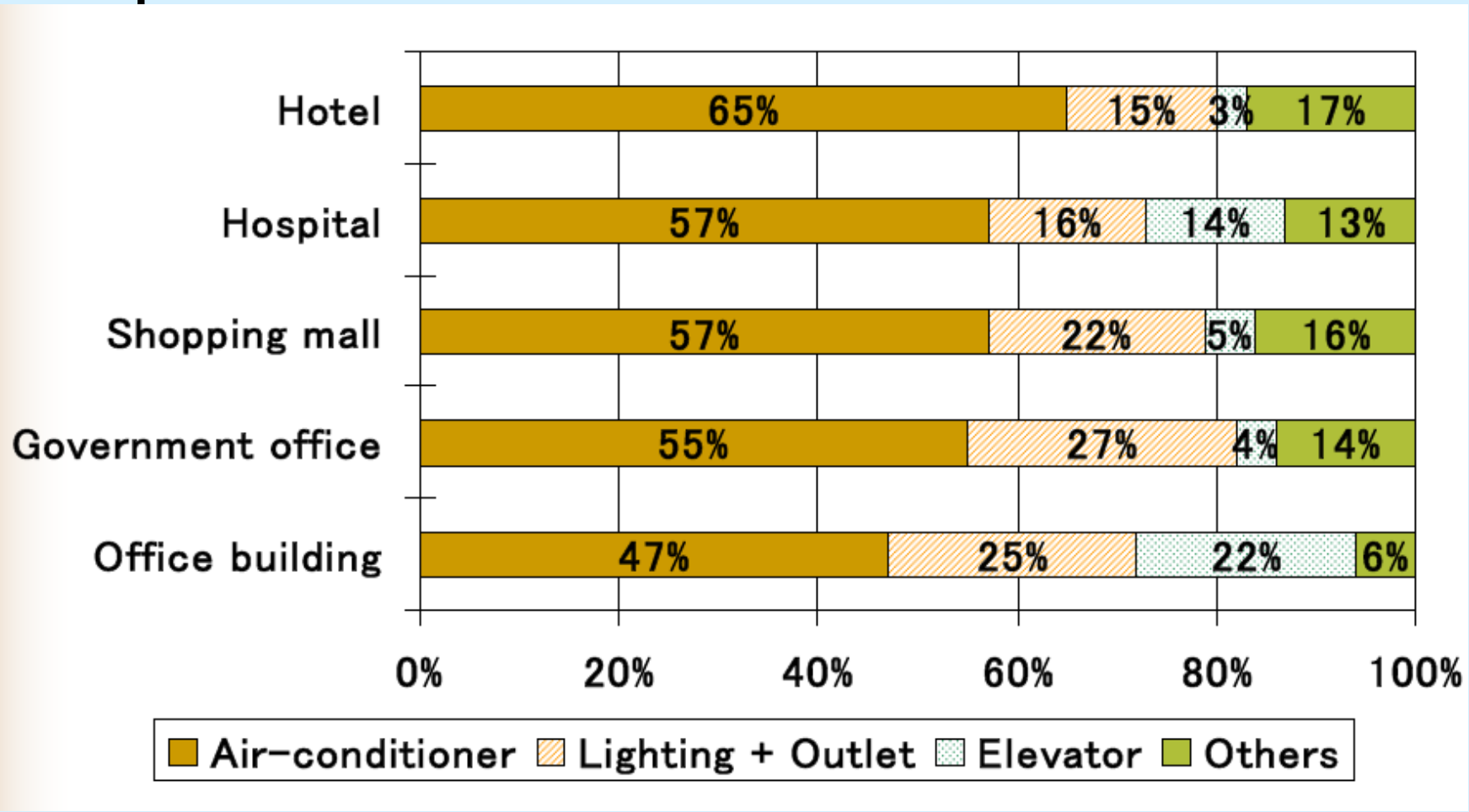
Source: APERC (2006).

End use energy in Residential Buildings



More than 50% of electiric power consumption in Residential users is for Refrigerator, Television, AC and Lighting

End use energy in Commercial Buildings



What is Sustainable Building?

- The term relates to both process and product;
- It is more meaningful at a national or regional or urban level;
- Strictly speaking, a fully sustainable building would have to, over its life-cycle:
  - Not cause a diminution of **fossil fuel supply**;
  - Not cause a diminution in net **potable water supply**;
  - Not cause a diminution in supply of **virgin materials**;
  - Cause zero net **emissions**;
  - Cause zero negative **ecological impacts**;
  - Cause no negative impacts on **construction workers, occupants or users** (or investors??);
- These are fairly tough targets to meet…

Differences between Green Building dan Sustainable Building

- Fuel consumption of non-renewable fuels
- Water consumption
- Land consumption
- Materials consumption
- Greenhouse gas emissions
- Other atmospheric emissions
- Impacts on site ecology
- Solid waste / liquid effluents
- Indoor air quality, lighting, acoustics
- Longevity, adaptability, flexibility
- Planning for good management
- Cost
- **Social and economic considerations**
- **Urban / planning issues**

Green Building

Sustainable Building

Green Building Rating Tool

- Green building rating tool is a tool to evaluate the performance of Green Building which consists of quantification of building performance during life cycle of the building
- Since 1980: BREEAM (BRE Environmental Assessment Method) U.K., LEED (Leadership in Energy and environmental Design) U.S., BEAM (Building Environmental Assessment Method) HK, CASBEE (Comprehensive Assessment System for Building Environmental Efficiency) Japan, Green Star (Australia), GBTool/SBTool (Canada), GREEANSHIP (Indonesia) in 2010, etc.

What is LEED?

The LEED Green Building Rating System was developed by the U.S. Green Building Council (USGBC) for **designing, constructing**, and **certifying** the world's greenest buildings.

LEED encourages and accelerates global adoption of **sustainable green building** and development practices through the implementation of **universally understood** and **accepted tools** and **performance criteria**.

Why LEED?

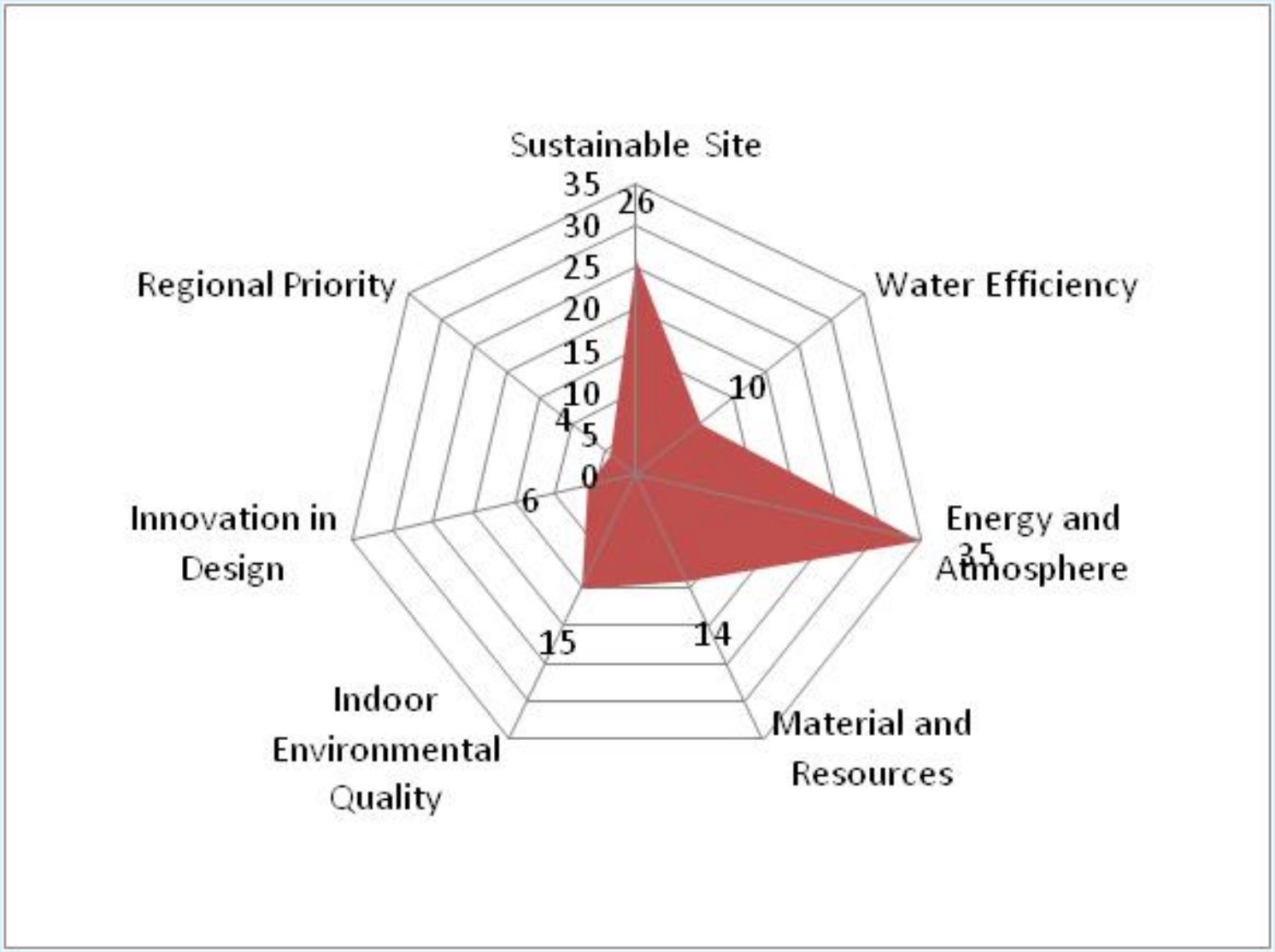
Why LEED?

The LEED Family of Rating Systems

- LEED for New Construction (NC)
- LEED for Commercial Interiors (CI)
- LEED for Core and Shell (CS)
- LEED for Existing Buildings (EB)
- LEED for Neighborhood Development (ND)

LEED New Construction and Major Renovation 2009

- Sustainable Site
- Water Efficiency
- Energy & Atmosphere
- Materials & Resources
- Indoor Environmental Quality
- Innovations & Design Process
- Regional Priority (Khusus untuk US & Kanada)

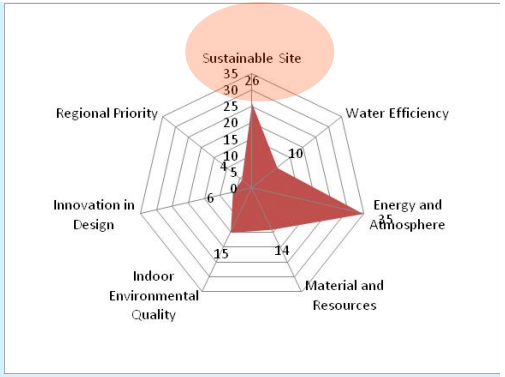

Sustainable Site
35
30
25
20
15
10
5
0
26
Water Efficiency
10
Energy and Atmosphere
35
14
Material and Resources
Indoor Environmental Quality
15
Innovation in Design
6
Regional Priority
4

LEED 2009 for New Construction and Major Renovations

100 base points; 6 possible Innovation in Design and 4 Regional Priority points

- **Certified** **40–49 points**
- **Silver** **50–59 points**
- **Gold** **60–79 points**
- **Platinum** **≥ 80 points**

Sustainable Sites (SS)
(26 Points)



Prereq 1	**Construction Activity Pollution Prevention**	Required
Credit 1	**Site Selection**	1
Credit 2	**Development Density & Community Connectivity**	5
Credit 3	**Brownfield Redevelopment**	1
Credit 4.1	**Alternative Transportation,** Public Transportation Access	6
Credit 4.2	**Alternative Transportation,** Bicycle Storage & Changing Rooms	1
Credit 4.3	**Alternative Transportation,** Low Emitting & Fuel Efficient Vehicles	3
Credit 4.4	**Alternative Transportation,** Parking Capacity	2
Credit 5.1	**Site Development,** Protect or Restore Habitat	1
Credit 5.2	**Site Development,** Maximize Open Space	1
Credit 6.1	**Stormwater Design,** Quantity Control	1
Credit 6.2	**Stormwater Design,** Quality Control	1
Credit 7.1	**Heat Island Effect,** Non-Roof	1
Credit 7.2	**Heat Island Effect,** Roof	1
Credit 8	**Light Pollution Reduction**	1

SS Prerequisite 1
Construction Activity Pollution Prevention

Intent

Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation

SS Credit 1
Site Selection

Intent

To avoid the development of inappropriate sites and reduce the environmental impact from the location of a building on a site.

Forbidden site to be developed

1. **Prime farmland** as defined by the U.S. Department of Agriculture
2. Previously **undeveloped land whose elevation is lower than 5 feet** above the elevation of the 100-year flood as defined by the Federal Emergency Management Agency (FEMA)
3. Land specifically identified as **habitat for any species** on federal or state **threatened or endangered lists**
4. **Land within 100 feet of any wetlands** as defined by the U.S. Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR within setback distances from wetlands prescribed in state or local regulations, as defined by local or state rule or law, whichever is more stringent

4 Previously **undeveloped land that is within 50 feet of a water body**, defined as seas, lakes, rivers, streams and
tributaries that support or could support fish, recreation or industrial use, consistent with the terminology of
the Clean Water Act

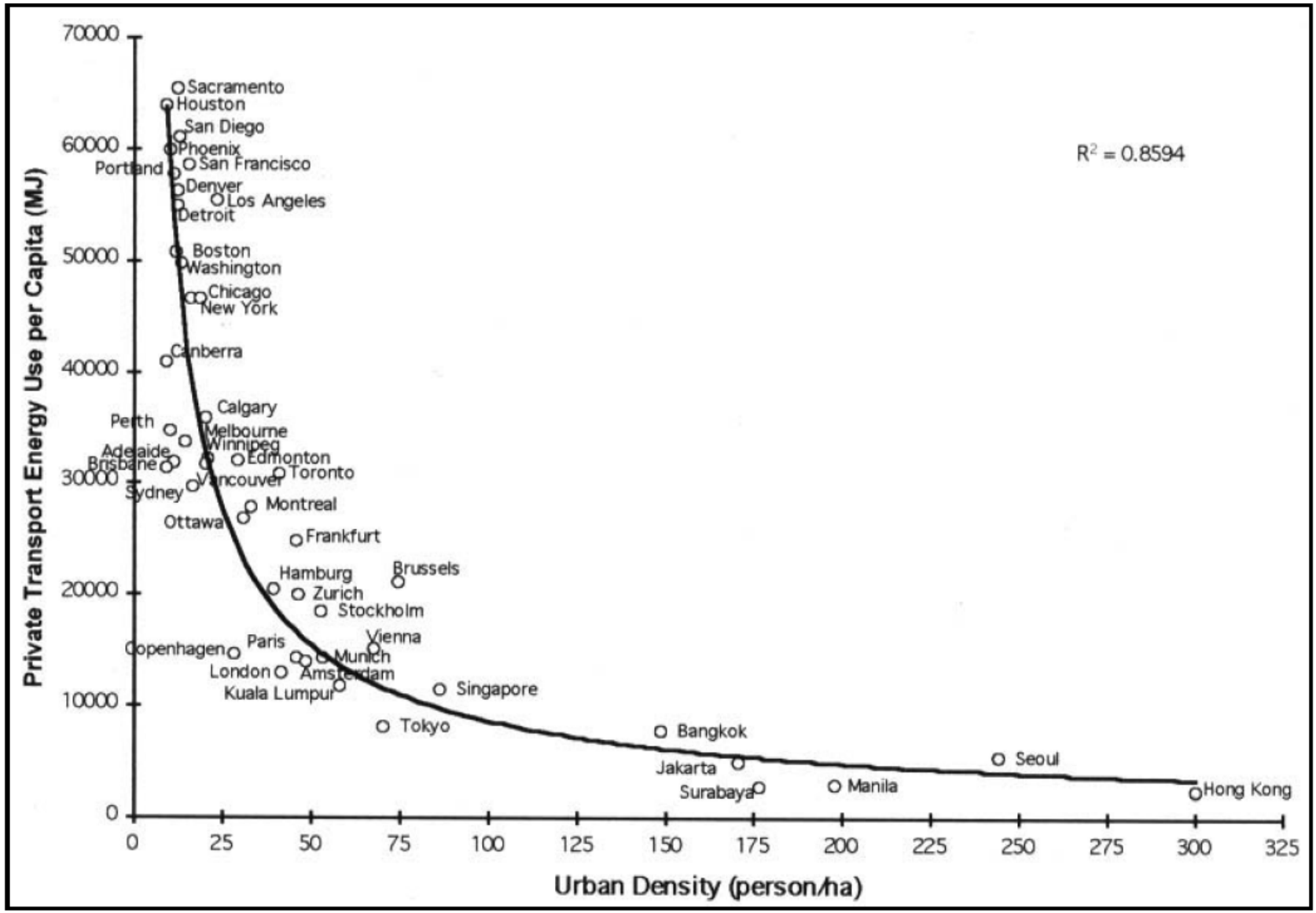
5. Land that prior to acquisition for the project was **public parkland**, unless land of equal or greater value as parkland is accepted in trade by the public landowner (park authority projects are exempt).

SS Credit 2
Development Density and Community Connectivity

Intent

To channel development to urban areas with existing infrastructure, protect greenfields, and preserve habitat and natural resources.

Figure 4. Energy use per capita in private passenger travel versus urban density in global cities, 1990.



Source: Newman and Kentworthy 1999, p 101.

SS Credit 3
Brownfield Redevelopment

Intent

To rehabilitate damaged sites where development is complicated by environmental contamination and to reduce pressure on undeveloped land.

SS Credit 4
Alternative Transportation

Intent

To reduce pollution and land development impacts from automobile use.

SS Credit 5.1
Site Development—Protect or Restore Habitat

Intent

To conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.

SS Credit 5.2
Site Development—Maximize Open Space

Intent

To promote biodiversity by providing a high ratio of open space to development footprint.

SS Credit 6.1
Stormwater Design—Quantity Control

Intent

To limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants.

Untuk membatasi gangguan hidrologi alami dengan mengurangi penutup tahan, meningkatkan di tempat infiltrasi, mengurangi atau menghilangkan polusi dari limpasan stormwater dan kontaminan menghilangkan.

SS Credit 6.2
Stormwater Design—Quality Control

Intent

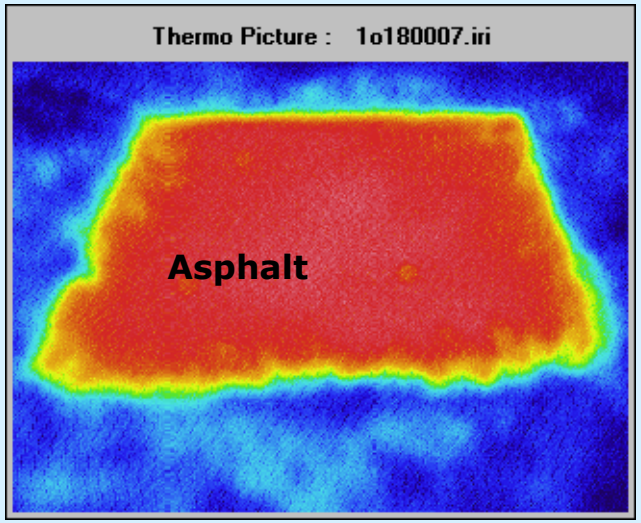
To limit disruption and pollution of natural water flows by managing stormwater runoff.

Untuk membatasi gangguan dan polusi aliran air alami dengan mengelola limpasan runoff

SS Credit 7
Heat Island Effect

Intent

To reduce heat islands to minimize impacts on microclimates and human and wildlife habitats.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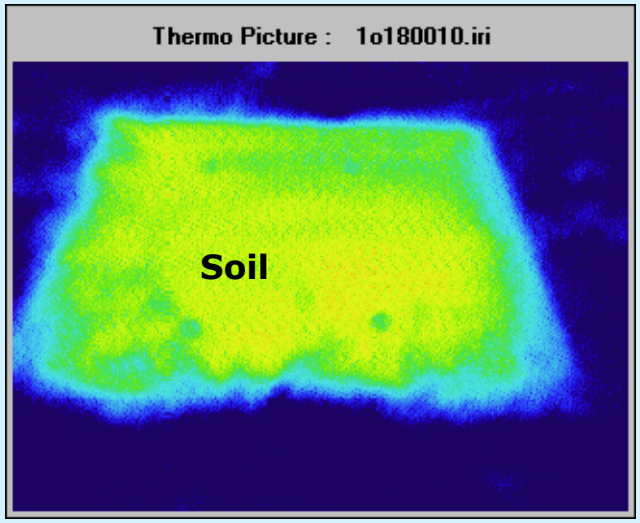
Asphalt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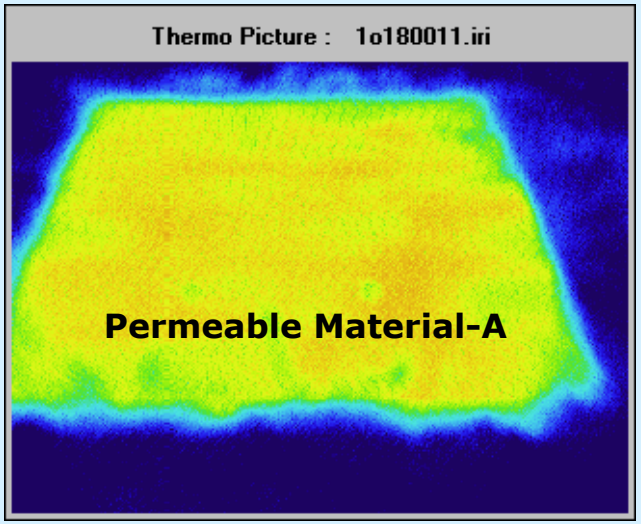
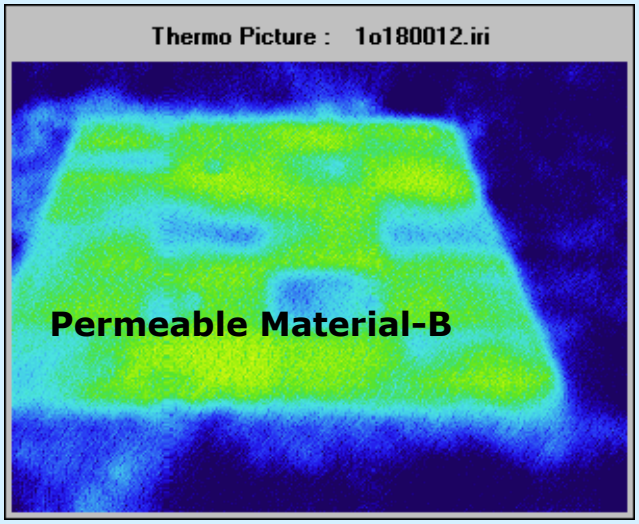
Soil


Thermo Picture : 1o180011.iri
Permeable Material-A

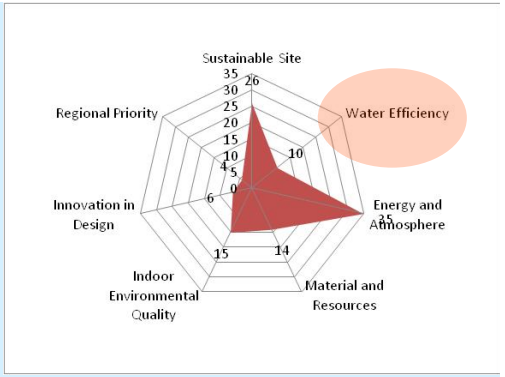

Thermo Picture : 1o180012.iri
Permeable Material-B

SS Credit 8
Light Pollution

Intent

To minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction and reduce development impact from lighting on nocturnal environments.

Water Efficiency (WE) (10 Points)



Prereq 1	**Water Use Reduction (20% reduction)**	Required
Credit 1	**Water Efficient Landscaping**	2-4
Credit 2	**Innovative Wastewater Technologies**	2
Credit 3	**Water Use Reduction,** 30-40% Reduction	2-4

WE Prerequisite 1
Water Use Reduction (20% reduction)

Intent

To increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

Untuk meningkatkan efisiensi air dalam bangunan untuk mengurangi beban pada pasokan air kota dan sistem air limbah.

WE Credit 1
Water Efficient Landscaping

Intent

To limit or eliminate the use of potable water or other natural surface or subsurface water resources available on or near the project site for landscape irrigation.

Untuk membatasi atau menghilangkan penggunaan air minum atau permukaan alami lainnya atau sumber daya air di bawah permukaan yang tersedia di atau dekat lokasi proyek untuk irigasi lansekap.

WE Credit 2
Innovative Wastewater Technologies

Intent

To reduce wastewater generation and potable water demand while increasing the local aquifer recharge.

Untuk mengurangi generasi limbah dan kebutuhan air minum, sementara meningkatkan resapan akuifer setempat.

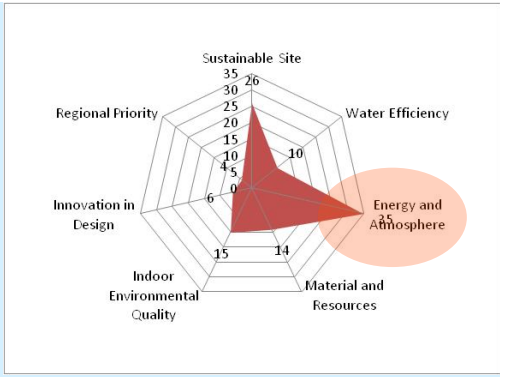
WE Credit 3
Water Use Reduction (30, 35 and 40% reduction)

Intent

To further increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

Untuk lebih meningkatkan efisiensi air dalam bangunan untuk mengurangi beban pada pasokan air kota dan sistem air limbah.

Energy & Atmosphere (EA) (35 Points)



Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Prereq 2	**Minimum Energy Performance**	Required
Prereq 3	**Fundamental Refrigerant Management**	Required
Credit 1	**Optimize Energy Performance**	1-19
Credit 2	**On-Site Renewable Energy**	1-7
Credit 3	**Enhanced Commissioning**	2
Credit 4	**Enhanced Refrigerant Management**	2
Credit 5	**Measurement & Verification**	3
Credit 6	**Green Power**	2

EA Prerequisite 1
Fundamental Commissioning of the Building Energy Systems

Intent

To verify that the building's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents.

EA Prerequisite 2
Minimum Energy Performance (10%)

Intent

Establish the minimum level of energy efficiency for the proposed building and systems.

Menetapkan tingkat minimum efisiensi energi untuk bangunan yang diusulkan dan sistem-sistem bangunan.

EA Prerequisite 3
Fundamental Refrigerant Management

Intent

To reduce stratospheric ozone depletion.

Untuk mengurangi penipisan ozon stratosfer.

EA Credit 1
Optimize Energy Performance

Intent

To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

EA Credit 2
On-site Renewable Energy

Intent

To encourage and recognize increasing levels of on-site renewable energy self-supply to reduce environmental and economic impacts associated with fossil fuel energy use.

Percentage Renewable Energy	Points
1%	1
3%	2
5%	3
7%	4
9%	5
11%	6
13%	7

EA Credit 3
Enhanced Commissioning

Intent

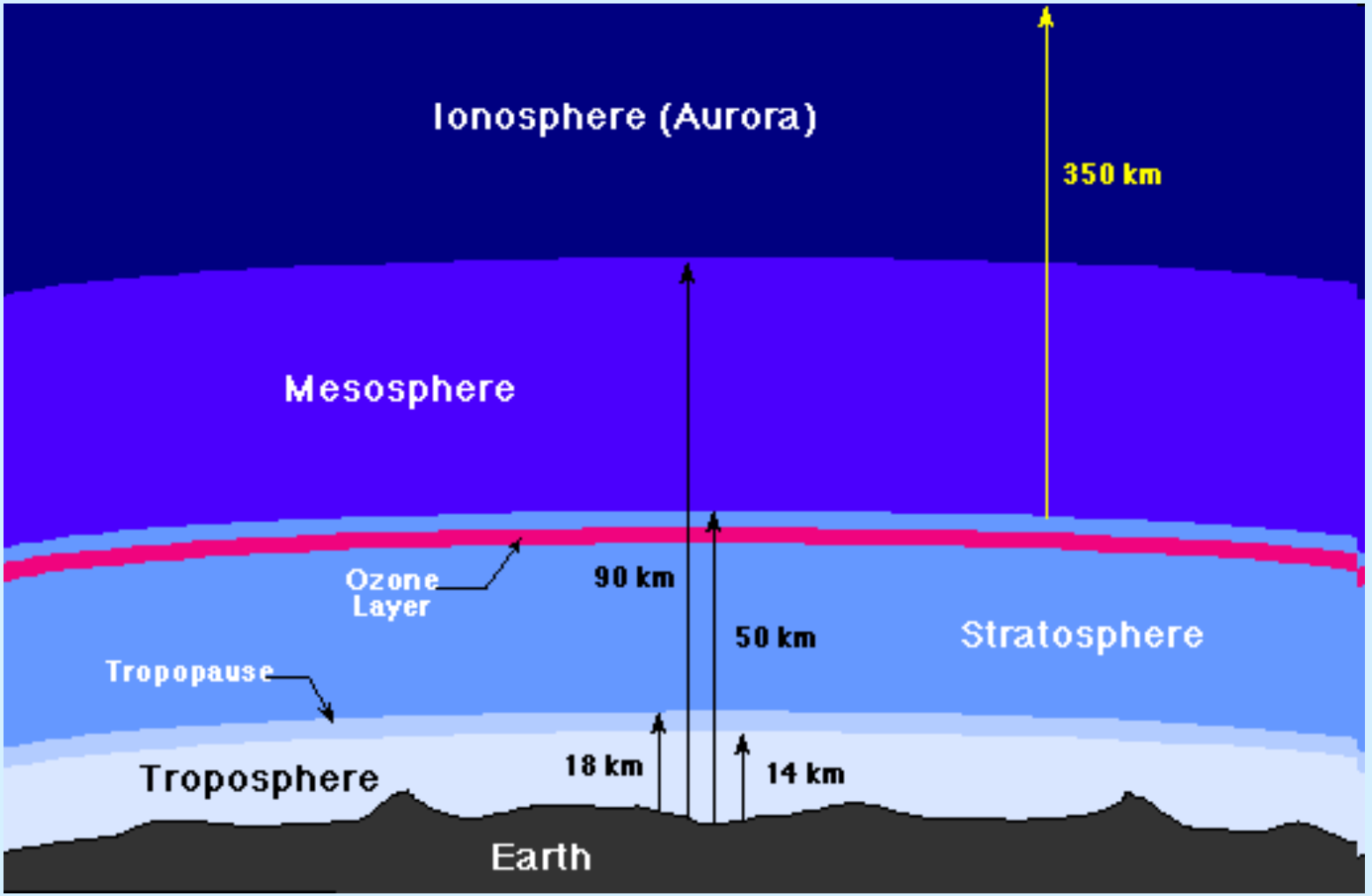
To begin the commissioning process early in the design process and execute additional activities after systems performance verification is completed.

EA Credit 4
Enhanced Refrigerant Management

Intent

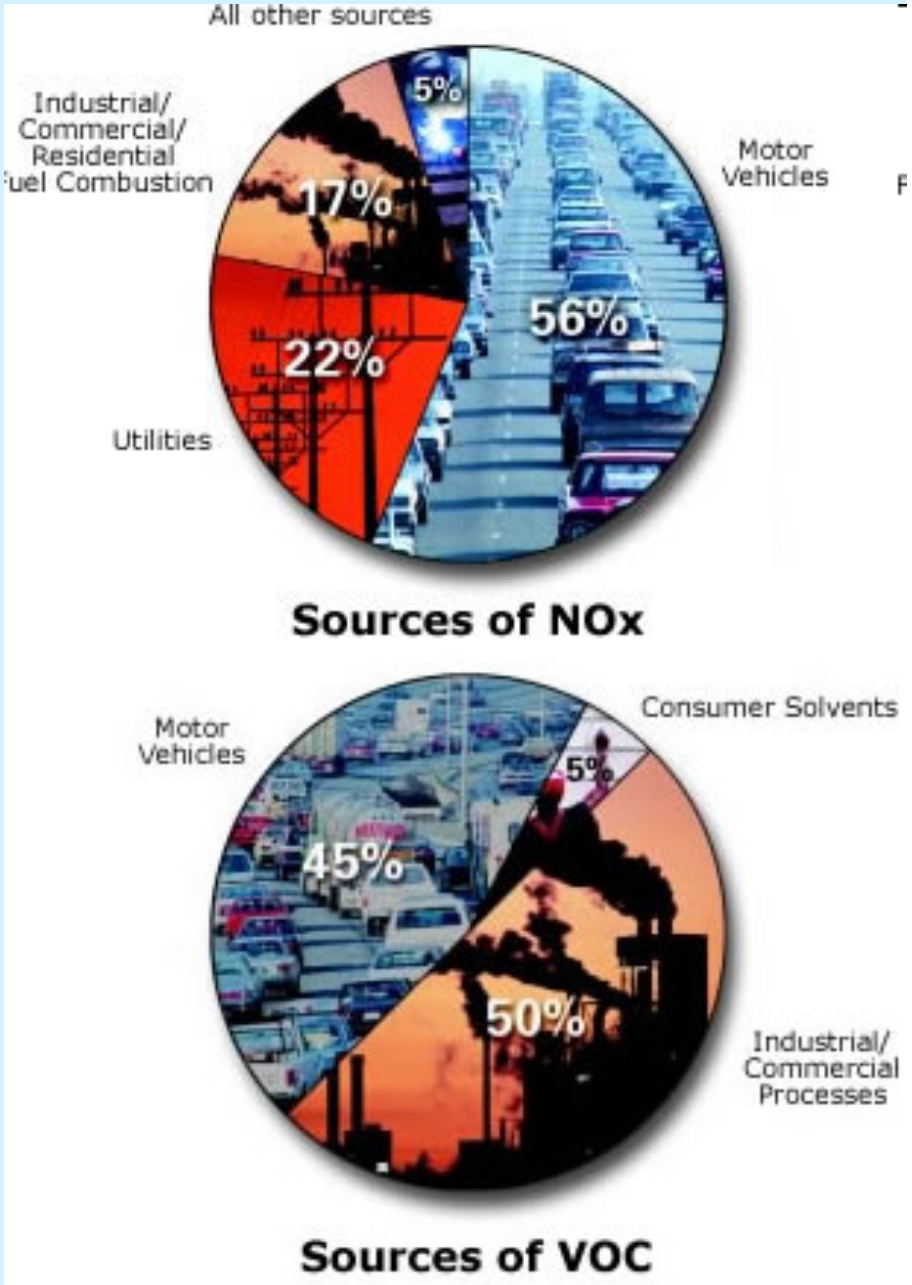
To reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to climate change.

EA Credit 4
Enhanced Refrigerant Management



Source of bad ozone

- Ground level Ozon (Bad ozon) made of chemical reaction between NOx and VOC with the help of sun shine



EA Credit 5
Measurement and Verification

Intent

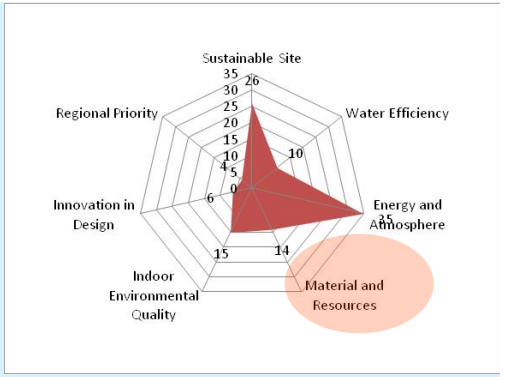
To provide for the ongoing accountability of building energy consumption over time.

EA Credit 6
Green Power

Intent

To encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis.

Materials & Resources (MR) (14 Points)



Prereq 1	**Storage & Collection of Recyclables**	Required
Credit 1.1	**Building Reuse,** Maintain Existing Walls, Floors & Roof	1-3
Credit 1.2	**Building Reuse,** Maintain Existing Interior Nonstructural Elements	1
Credit 2	**Construction Waste Management**	1-2
Credit 3	**Materials Reuse**	1-2
Credit 4	**Recycled Content**	1-2
Credit 5	**Regional Materials**	1-2
Credit 6	**Rapidly Renewable Materials**	1
Credit 7	**Certified Wood**	1

MR Prerequisite 1
Storage and Collection of Recyclables

Intent

Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

MR Credit 1.1 - 1.2
Building Reuse

Intent

To extend the lifecycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.

MR Credit 2
Construction Waste Management

Intent

To divert construction and demolition debris from disposal in landfills and incineration facilities. Redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites.

MR Credit 3
Materials Reuse

Intent

To reuse building materials and products to reduce demand for virgin materials and reduce waste, thereby lessening impacts associated with the extraction and processing of virgin resources.

MR Credit 4
Recycled Content

Intent

To increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

MR Credit 5
Regional Materials

Intent

To increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

MR Credit 6
Rapidly Renewable Materials

Intent

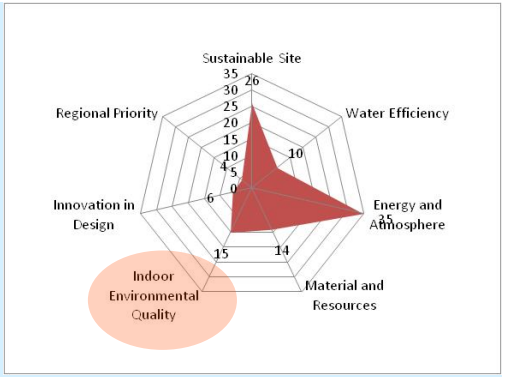
To reduce the use and depletion of finite raw materials and long-cycle renewable materials by replacing them with rapidly renewable materials.

MR Credit 7
Certified Wood

Intent

To encourage environmentally responsible forest management.

Indoor Environmental Quality (EQ) (15 Possible Points)



Prereq 1	**Minimum IAQ Performance**	**Required**
Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	**Required**
Credit 1	**Outdoor Air Delivery Monitoring**	1
Credit 2	**Increased Ventilation**	1
Credit 3.1	**Construction IAQ Management Plan, During Construction**	1
Credit 3.2	**Construction IAQ Management Plan, Before Occupation**	1
Credit 4.1	**Low-Emitting Materials, Adhesives & Sealants**	1
Credit 4.2	**Low-Emitting Materials, Paints & Coatings**	1
Credit 4.3	**Low-Emitting Materials, Flooring Systems**	1
Credit 4.4	**Low-Emitting Materials, Composite Wood & Agrifiber Products**	1
Credit 5	**Indoor Chemical & Pollutant Source Control**	1
Credit 6.1	**Controllability of Systems, Lighting**	1
Credit 6.2	**Controllability of Systems, Thermal Comfort**	1
Credit 7.1	**Thermal Comfort, Design**	1
Credit 7.2	**Thermal Comfort, Verification**	1
Credit 8.1	**Daylight & Views, Daylight**	1
Credit 8.2	**Daylight & Views, Views**	1

EQ Prerequisite 1
Minimum IAQ Performance

Intent

Establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.

EQ Prerequisite 2
Environmental Tobacco Smoke (ETS) Control

Intent

Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke (ETS).

EQ Credit 1
Outdoor Air Delivery Monitoring

Intent

To provide capacity for ventilation system monitoring to help promote occupant comfort and well-being.

EQ Credit 2
Increased Ventilation

Intent

To provide additional outdoor air ventilation to improve indoor air quality (IAQ) and promote occupant comfort, well-being and productivity.

EQ Credit 3
Construction Indoor Air Quality Management Plan

Intent

To reduce indoor air quality (IAQ) problems resulting from construction or renovation and promote the comfort and well-being of construction workers and building occupants

EQ Credit 4
Low Emitting Materials

Intent

To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.

EQ Credit 5
Indoor Chemical and Pollutant Source Control

Intent

To minimize building occupant exposure to potentially hazardous particulates and chemical pollutants.

EQ Credit 6
Controllability of Systems

Intent

To provide a high level of lighting/ventilation system control by individual occupants or groups in multi-occupant spaces (e.g., classrooms and conference areas) and promote their productivity, comfort and well-being.

EQ Credit 7
Thermal Comfort

Intent

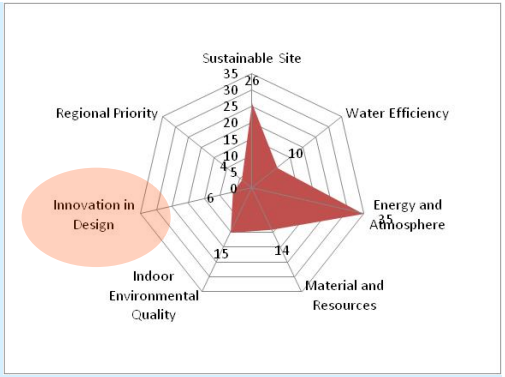
To provide a comfortable thermal environment that promotes occupant productivity and well-being.

EQ Credit 8
Daylight and Views

Intent

To provide building occupants with a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

Innovation and Design Process (ID) (6 Points)



Credit 1	**Innovation in Design**	1-5
Credit 2	**LEED Accredited Professional**	1

Conclusion

Green Building memiliki peran yang sangat strategis dalam rangka meningkatkan kualitas lingkungan binaan, baik yang berupa bangunan maupun lingkungan sekitarnya.

Thank You!

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